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Some types of industrial education in Germany...

[S.l.]

[1914?]

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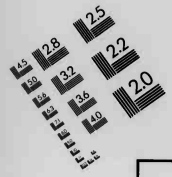
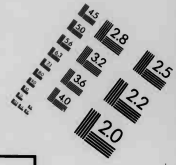
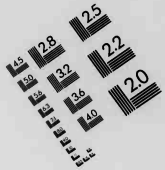
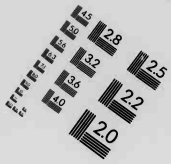

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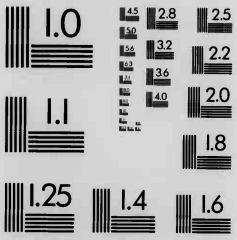

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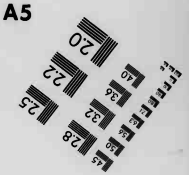
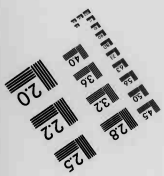
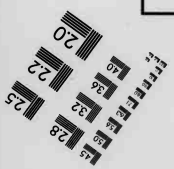
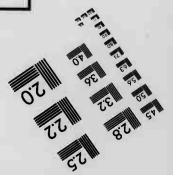

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SOME TYPES OF INDUSTRIAL EDUCATION IN GERMANY AND ENGLAND

REPORT OF OBSERVATIONS AND STUDY OF THE SAME

By T. W. GOSLING

The following is the final and complete report of Dr. T. W. Gosling, who was sent abroad in the spring of 1914 to study the Continuation and Industrial Schools of Europe, more especially of Germany, and most of all of Munich.

A brief preliminary report was printed in the 85th Annual Report. This complete report is presented at this time that it may serve as a guide in the organization and development of the new Bloom School, of which Dr. Gosling has been appointed principal, and which will be ready to open early in the school year 1915-16.

The keenness of his observation, the thoroughness of his study and saneness of his deductions and recommendations show that the Board was wise in delegating him to make this study and report, which can be used in the development of industrial and continuation school education in Cincinnati.

RANDALL J. CONDON.

PART ONE

INDUSTRIAL EDUCATION

I — THE MUNICH CONTINUATION SCHOOLS

The system of industrial education in Munich has attracted almost worldwide attention. In Munich, perhaps more than elsewhere in Germany, the schools are brought into close relationship with the trades. The aim is to provide some form of public education for every boy who is to become an industrial worker. Adequate provision for the education of girls has not yet been made. The principle of adaptation is noticeable generally in the schools of Germany. Nowhere else, however, has the principle been worked out with such completeness as in Munich.

To all who are able to pay for the privilege of the higher education, Munich offers superior advantages. The Technical College (Technische Hochschule), an institution of the State of Bavaria, is one of the first colleges of its kind in the world. The University, also, both in numbers of students and in quality of instruction, ranks with the best. Since opportunities are everywhere sufficiently numerous for those who can afford to pay for them, it is not necessary for the purposes of this report to go into detail concerning the special distinction of Munich in schools for the higher education. For a city like Cincinnati, concerned with the problem of developing a system of free public education for industrial workers, the free municipal continuation schools of Munich are most instructive.

Most of the children of Munich attend the elementary schools. Those who are preparing for the higher education attend the middle schools — the Gymnasien and the Realschulen. When the Munich children finish the elementary schools at the age of fourteen, they do not find, as with us, openings for further education in higher institutions of learning. Except in rare instances, due to special determination and unusual qualities of mind, these elementary school children find the doors of the higher state-controlled schools closed against them. They and their parents have known that this would be the case. By deliberate choice, which in most cases is determined by financial considerations, they have cut themselves off from the possibility of belonging to the so-called "educated class." They have chosen to be workers in the fields of commerce and industry.

Thus it happens that every year a large number of boys and girls who are fourteen years old are thrust out into the world of active life. What is to be done with them? Under the law of Bavaria they are not yet wholly free from control by the school. Until they are sixteen years of age they must continue to receive some instruction each week in the academic subjects and in religion. In the rural districts of Bavaria this instruction is given, as it was formerly given in the cities, in the Sunday school. The length of the weekly sessions was from two and one-half to three hours. The Wednesday schools for girls in Munich continue the kind of instruction that was formerly given in the Sunday schools. In the course of time the inadequacy of these educational provisions for boys and girls over fourteen years of age became painfully apparent.

Although the apprenticeship system still prevails in Germany, the conditions that govern the system are by no means what they were in earlier days. Formerly a parent was obliged to pay for the privilege of having his son apprenticed to a master. This master in turn assumed towards the boy a position *in loco parentis*. With the growth of commerce and industry, the pressure of competition became heavier. The division of labor made specialization almost a necessity. For this and other reasons, masters were no longer able or willing to give to their apprentices the same generous consideration as was given by the masters of an earlier generation.

In consequence of the changing conditions in industrial and commercial life, changes which profoundly affected the education of the young, the public school authorities were led to realize that something must be done by the schools in order to save boys and girls from the narrowing effect of the new industrial regime. It was not possible to take boys and girls altogether out of industry in order to send them to school. The economic necessity of parents precluded any such course as that. An enlargement and reorganization of the existing continuation schools offered the readiest solution of the problem.

The first step in reorganization was to establish general courses in the old continuation schools, and to give instruction on week days instead of on Sunday. These general continuation schools were not intended to give training for any specific trade, but merely to offer that kind of instruction which is supposed to give a better grasp upon the problems of life than the general cultivation of mental power can give. The work was not wholly academic in character. It included a considerable amount of handwork of a kind, however, not functioning specifically in any one trade.

The particular contribution which Munich has made to the development of the continuation school movement consists in adding to the lists of theoretical and academic subjects, a course in actual shop practice within the school itself, instead of turning over to the masters the entire work of instruction in the mechanics of their trade. The schools that undertake this kind of work are called Fachschulen or special trade schools, as distinguished from the other type, where only general instruction is given.

In the opinion of the Munich authorities, actual technical training within the school is necessary not only to give the apprentices a more comprehensive view of their trade than the masters are likely to give, but also to add zest and significance to the instruction in the theoretical subjects. The ranks of the journeymen and the masters in industry are recruited from apprentice boys of the special industrial continuation schools. There is for these boys, however, no opening into the higher institutions of learning nor into the learned professions.

Evidence that the special trade schools are performing a real service is furnished by the fact that whereas formerly twenty per cent of the boys who finished the elementary course were without a definite vocational choice, now only seven per cent of the fourteen-year-old boys have failed to apprentice themselves to masters for the purpose of learning specific trades. For this small minority of boys the general continuation school (Allgemeine Fortbildungsschule) is still maintained. For the most part the boys who attend this latter type of school are those who through dullness, lack of ambition, or parental greed, choose to become wage-earners at the earliest time allowed by law, instead of postponing the wage-earning period until such time as they can learn trades by means of apprenticeship to masters. These boys take the blind-alley jobs; they attend the continuation school one day a week for about six hours until they are sixteen years old; then they join the ranks of unskilled labor.

Ninety-three per cent of the boys who leave the elementary school become apprentices to the masters of special trades at the age of fourteen. After trying the boy for a period of about six weeks, the father and the master to whom the boy is to be apprenticed, sign a contract which cannot be broken except by mutual consent or by action of that branch of the government which is charged with the supervision of apprentices. Under the terms of the contract, the master undertakes to teach the boy his trade and also to allow him from seven to ten hours a week for attendance at the continuation school. These hours may be concentrated in one day or divided into

two half days in the week. It is for these apprentice boys (Lehrlinge) that the Fachschulen or special trade schools are intended.

Successful as these schools have been, they have not found universal favor. In many places in Germany strong opposition to the Munich plan may be found. In Northern Germany in particular the opposition is very strong. There many of the leading educators maintain that it is not within the function of the school to give specific trade training. In their judgment only the shop can give effective shop practice. When the school undertakes to do the work which ought to be done by the shop it imposes a heavy burden of expense upon the community, and in addition it gives a kind of dilettante training which unfits the boys for real shop experience. The charge is made that in the special trade schools boys learn theories and methods which they must abandon when they become actual journeymen.

In order to ascertain how the employers in Munich regarded the work of the special trade schools, I visited the shops of many of the masters and made careful inquiry. Although a few (masters) spoke disparagingly of the schools on the ground that the apprentices who attended them were too theoretical and too little inclined to follow the usual methods, the great majority of the masters were enthusiastic in their praise. There is no doubt that the employers of Munich are strong supporters of the Munich plan of education. They aid the schools by financial contributions and by service on consultative committees which formulate courses of study and which recommend the teachers of the technical subjects.

After careful weighing of the arguments advanced by the opponents of the system, I have become convinced that the opposition is founded upon a misconception. That misconception consists in assuming that the special trade schools are undertaking to duplicate the work of the masters, whereas in reality these schools seek only to do what the masters leave undone. It is frequently to the interest of the masters to give the apprentice a training that is too highly specialized. Greed and the pressure of competition sometimes force upon them a violation of the spirit of their contract. The schools realize this defect in the organization of modern industry, and they seek to remedy it by giving the larger outlook not only by means of instruction in the theoretical and cultural studies, but also through the agency of specific trade training in processes which are necessary to the mastery of the special trades but which are not always necessary in the more or less superficial work of the apprentice, especially if that apprentice happens to be under the instruction of a master who is not actuated by a desire to do all he can for the education of the boy who is entrusted to his care.

That the plan of the Munich special trade continuation schools is conceived on the broadest lines is shown in the writings of Dr. Georg Kerschensteiner, who, as Superintendent of Schools, has had most to do with the organization of the whole system. The interest of the pupils in practical work is the basis of that larger education which takes into account the whole need of human life. "If this compulsory continuation school is to be in reality a home of education, it must . . . engage the interest of its pupils. But it can engage their interests *only if it interweaves its teaching with the trade of the pupil.* If the school appeals to their interest, it may be sure of gaining the heart of its pupils. And if it has gained the pupil's heart, it can lead him whither it will; on to theoretical as well as practical ground; on to the ground of moral and civic teaching. If the pupil is to learn the meaning of real joy in work, his school must fill up the gaps left in his education by present economic conditions of life. It can do this only if it takes in hand his practical work and makes this the center of its entire system of teaching."*

It is interesting to note that even in parts of Germany where the theoretical objections to the Munich plan are still maintained with some vigor, there is a marked though gradual tendency to copy that plan with only slight modifications suited to local conditions. In Cologne, for example, where the Director of Trade Schools had expressed to me in person very strong arguments against the Special Trade School of Munich, I found upon my visits in the schools several examples of the same kind of organization as Munich is following. I found in Nürnberg and in Frankfort am Main a similar tendency to follow the Munich example.

If boys who are fourteen years of age must go to work it is to the interest of the community that they should prepare themselves for some definite calling where there are opportunities and occasion for improvement, rather than that they should be allowed to drift aimlessly through the years without that incentive to honest effort which comes only with the exercise of conscious power skillfully directed to definite ends. It is this definite, purposeful, intelligent preparation which the Munich Special Trade Schools endeavor to give.

*Georg Kerschenstein: Introduction (p. XIII) to "The Problem of the Continuation School," by Best and Ogden (P. S. King & Son, London, 1914).

The educational authorities of Munich plan to establish a special trade school for the apprentices in every trade in the city provided that trade employs as many as twenty apprentices. If fewer than twenty are employed, they are sent to a school that gives instruction in a trade which is closely allied to the one in which they are engaged. For example, pattern making is a Munich trade which employs very few apprentices. Consequently the apprentices who are preparing to become pattern makers attend the school for carpenters and joiners. Likewise there are very few apprentices in the trade of stereotyping. These attend the school for printer — and typesetter — apprentices. Here they receive the same instruction in all studies including stereotyping as is given to the students of printing and typesetting. The amount of time given to the study of stereotyping is only ten hours a week for ten weeks.

The published report for the school year 1912-13 stated that there were fifty-four special trade schools in Munich and eleven continuation schools of the general type. This number is gradually increasing. In the summer of 1914, the Munich School Commission made provision for extending to girls opportunities for trade training similar to those now enjoyed by boys. The plans contemplated the establishment of schools for girl apprentices in eleven different trades. Incidentally it may be said that by a strange decision the establishment of the continuation schools for special instruction in the household arts was postponed. Thus preference was given to the schools intended to train in the industrial art and in commercial subjects.

The opportunities for commercial education in Munich are parallel to those which are offered in preparation for industry. It is expected that the higher commercial positions will be filled by graduates of the Handelshochschule or commercial college. Graduates of the Städtische Handelsschule or city commercial school are qualified for the intermediate positions. The Kaufmännische Fortbildungsschule or commercial continuation school is intended for the training of those young people who take commercial positions immediately upon finishing the elementary school at the age of fourteen. These young workers — both boys and girls — attend a continuation school for eight hours a week for three years. Provision is made for giving the instruction on the morning of one day and on the afternoon of another day in order to interfere as little as possible with the work of the employer.

The following course is offered in the commercial continuation school:

VOCATIONAL DEPARTMENT TABLES

COMMERCIAL CONTINUATION SCHOOL.

Subjects of Instruction	Hours of Instruction (Per Week)			
	Preparatory Class	First Class	Second Class	Third Class
A—Compulsory.				
Religion	1	1	1	.....
Arithmetic and Science of Exchange	2	2	2	1
Bookkeeping	.....	1	1	2
Commercial Correspondence	2	1	1	1
Commercial Geography and Knowledge of Wares (With Reading)	1	1	1	2
Hygiene and Civics	1	1	1	1
Commercial Law	.....	.....	.....	1
Penmanship	1	1	1	.....
Total	8	8	8	8
B—Optional.				
Stenography (Gabelsberger System)	.....	2	2	2
Typewriting	.....	½	½	½
Foreign Languages	.....	2	2	2

The fact that stenography and typewriting are elective subjects indicates that in the view of the Munich education authorities commercial instruction has a far wider scope than the preparation of boys and girls for secretarial positions. Further evidence of breadth of purpose in the commercial continuation school is offered in the manner in which students are classified. The leading commercial activities take their characteristics from the materials with which they deal. On this basis, four groups are arranged, to one of which each pupil is assigned according to the work which he is doing outside of school. These groups are as follows:

I — Banking, transportation, insurance, the book trade.

II — Groceries, agricultural products, meats, and other victuals, and special forms of necessity and luxury.

III — Textiles, confections, leather, hides, skins, and special branches of the clothing trade.

IV — Glass, clay, porcelain, jewelry and fancy articles, stationery, hardware, building materials, fuel and other special materials from inorganic nature.

In the arrangement of courses of study in the special trade continuation schools certain subjects are accepted as funda-

mental and common to all. Thus every course of study contains provision for instruction in religion, German literature and composition, and hygiene and civics. Arithmetic and bookkeeping also are found in most of the courses. Although the special trade continuation schools are vocational in character, the school authorities are unwilling to limit the students in attendance to training of a purely vocational type. Liberal and cultural studies are deemed necessary even for those whose lives are to be in a field of activity where culture has formerly seemed to be unnecessary. This educational policy is expressed by Dr. Georg Kerschensteiner, as follows:—

"The end of all education is not the technically competent workman, but the citizen of the state, who not only seeks to advance his own welfare through his work, but also consciously places his work in the service of the community. The next essential of the continuation school is, therefore, the attitude of regarding technical education only as a means for mental and moral training. Not until the organization has entered on this path will the compulsory continuation day trade school prove itself valuable enough to justify the large expenditure which it requires." (1)

Further insight into the philosophy of the Munich system is gained by an understanding of the use which the school expects to make of practical work as a means to an end. Again the words of Dr. Kerschensteiner are illuminating:—

"In the rapidly increasing large towns there are hundreds of thousands who leave the primary schools and are suddenly admitted to a momentous freedom. The gentle restraint of a well-ordered family life, with all its good suggestions, no longer influences them. Other attractions, from all holes and corners, allure the sensuous egoism, while both the moral and the intellectual instincts, which the school has matured, are still too weak to resist temptation constantly. How then shall we approach the young citizen to develop in him a discerning altruism? To this question only one answer appears to me possible — at his work." (2) "While work and habit are the best means of overcoming our selfishness and indolence, and thus leaving the way free for other efforts, especially the altruistic, they do more than this; they produce the desire to be good and moral. This desire is the fundamental condition for all higher education. No spiritual teaching can be assimilated without it. Character is not to be gained by the reading of books or the hearing of sermons, but by continuous and steadily applied work. Our public and private institutions, our curricula and time-tables, should be judged quite as much by their influence on the will as by their influence on the intellect. Aristotle drew attention to this when he demanded that the moral side of our social arrangements should be judged by the habits it implants in the individual, and asserted that the most important matter was how, and how far, they direct the young man's activity into the right path from the beginning. Therefore, conscientious but joyful service, and the habit of making a good job of every piece of work, are the means by which the hard soil of egoism must be cultivated so that it is capable of receiving the seed of insight and making it germinate."*

(1) Georg Kerschensteiner: Introduction (p. XIV) to "The Problem of the Continuation School," by Best and Ogden (P. S. King & Son, London, 1914).

(2) Georg Kerschensteiner: "Education for Citizenship," (G. G. Harrap & Co., London, 1912, pp. 55-6).

A few typical curricula in schools for apprentices will show this linking of theoretical with practical instruction:—

SCHOOL FOR PRINTERS AND TYPESETTERS.

Subjects of Instruction	Hours of Instruction (Per Week)					
	For Typesetters' Apprentice			For Printers' Apprentice		
	First Class	Second Class	Third and Fourth Clas	First and Second Class	Third Class	Fourth Class
Religion	1	1	.....	1	.....	.....
German Language, Composition and Reading	3	2	1	1	1	1
Mathematics and Bookkeeping	1	1	1	1	1	1
Foreign Languages	.....	.....	1	.....	.....	.....
Hygiene, Civics, and Industrial History	1	1	1	1	1	1
Drawing	2	2	2	2	2	2
Practical Instruction in Science of Materials, Tools and Machines, and in Stereotyping	1	2	3	3	4	4
Total	9	9	9	9	9	9

*(ibid pp. 55-6.)

School for Gardeners.

Subjects of Instruction	Hours of Instruction (Per Week)		
	First Class	Second Class	Third Class
Religion	1	1	.....
Business Composition	1½	1½	1½
Arithmetic, with Bookkeeping, Surveying	1½	1½	1½
Hygiene and Civics	1	1	1
Botany and Horticulture	1½	1½	1½
Drawing	1½	1½	1½
Total	8	8	7

School for Machinists.

Subjects of Instruction	Hours of Instruction (Per Week)		
	First Class	Second Class	Third Class
Religion	1	1	.....
Business Composition and Reading	1	1	1
Industrial Arithmetic	1	1	1
Hygiene and Civics	1	1	1
Physics	1	1	.....
Description of Machines	.....	.....	2
Technical Drawing	2	2	2
Practical Instruction, including Craftsmanship and Knowledge of Materials	2	2	.....
Science of Machine Tools	.....	.....	2
Total	9	9	9

School for Chimney Sweeps.

Subjects of Instruction	Hours of Instruction (Per Week)	
	First and Second Classes	Third Class
Religion	1	.....
Business Composition and Reading	2	1
Industrial Arithmetic	1½	1
Hygiene and Civics	1½	1
Technology	.....	2
Science of Heat	.....	1
Technical Drawing	2	2
Total	8	8

School for Waiters.

Subjects of Instruction	Hours of Instruction (Per Week)		
	First Class	Second Class	Third Class
Religion	1	1	.....
Business Composition and Reading	1	1	2
Business Arithmetic and Bookkeeping	1	1	2
Hygiene and Civics	1	1	1
Technical Information	1	1	1
French Conversation	2	2	2
Practical Instruction	1	1	.....
Total	8	8	8

School for Tailors.

Subjects of Instruction	Hours of Instruction (Per Week)		
	First Class	Second Class	Third Class
Religion	1	1	.....
Business Composition	1	1	1
Arithmetic and Bookkeeping	1	1	1
Hygiene and Civics	1	1	1
Knowledge of Materials	1	1	1
Technical Drawing and Design	1	1	2
Practical Instruction	2	2	2
Gymnastics	1	1	1
Total	9	9	9

School for the Building Trades.
(Bricklayers, Stonemasons and Carpenters.)

Subjects of Instruction	Hours of Instruction (Per Week)					
	Winter Term Oct. 15—March 15			Summer Term March 15—Oct. 15		
	First Class	Second Class	Third Class	First Class	Second Class	Third Class
Religion	1	1	.....	1	1	.....
Business Composition and Reading	1	1	1	1	1	1
Arithmetic and Bookkeeping	1	1	1	1	1	1
Hygiene and Civics	1	1	1	1	1	1
Technical Drawing	3	3	3	2	2	2
Practical Instruction and the Science of Materials	3	3	3	.....	.....	.....
Total	10	10	9	6	6	5

Since the law of Bavaria requires all children to receive instruction in religion until they are sixteen years old, a course in religious instruction is incorporated in every curriculum. This instruction is given in the school buildings by priests and clergymen who are designated for the purpose. Catholic priests, evangelical ministers, and Jewish rabbis teach the children of their own communion. This method of giving within the school the kind of religious instruction demanded by various denominations makes unnecessary the cleavage so common in America between public and parochial schools. Although the unity which German education attains in this manner is to be commended, the results in other directions are not equally meritorious. Religious prejudice and bigotry are very marked. Furthermore, the kind of religious instruction given under the present system tends strongly toward formalism and does not appear to have any marked effect upon the national life.

Although religious instruction occupies a certain detached and isolated position within the school, the other subjects of study are linked together in intimate association. The more the work of the school is adapted to the particular trade of the boy, the greater the interest he takes and the better the results. The young apprentices are not so much interested in the theoretical studies — composition, arithmetic, civics, religion — as in the practical work. Consequently the effort is made to bring the theoretical studies into close relations with the practical work of the trades. The detailed method of effecting this correlation becomes quite apparent to one who follows a class through the exercises of a day. For illustration, we may take a class of apprentices who are learning the trade of making stained-glass windows, a trade for which Munich is justly famous. In the drawing lesson I found the boys engaged in drawing and coloring designs suitable for window decoration. In the arithmetic lesson these same boys were calculating measurements and the cost of labor and materials in the making of a window according to given specifications. In the civics class the instruction turned upon the lives and the works of famous artists. Later in composition the boys would talk about the history of their trade and about the men who have attained distinction in it. In this manner practical work and theoretical instruction were made to support each other and to contribute jointly to the education of the boys what neither could contribute separately.

Adaptation to individual needs is the distinguishing characteristic of the Munich Continuation Schools. This adaptation is shown in a large way by the provision which is made

for instruction in many different trades. It is shown in smaller ways by differentiation wherever differentiation is likely to be advantageous to the student. For example, although drawing is recognized almost everywhere in the Munich schools as a study of very great importance, the young apprentices in the School for Glove-Makers have no drawing, because it would be of little value to them. In another way adaptation is shown by including a course in gymnastics for tailors' apprentices because on account of their sedentary occupation, exercise is essential to their physical well-being. For other apprentices in the various continuation schools no provision for physical training is made because none seems to be needed in the case of boys whose daily life includes a large amount of physical activity.

In view of the large service which these continuation schools are rendering to the community, one would expect to find a heavy burden of expense. The records of school expenditure, however, do not fulfill the expectation. In 1910 each pupil in the continuation schools cost the City of Munich about eighty marks (approximately twenty dollars); each elementary school pupil cost about ninety-three marks; and each pupil in the higher schools of the state cost about two hundred marks. In 1913 the annual cost of each pupil in the continuation schools had risen to about one hundred marks. Presumably there was a corresponding increase of expense connected with the elementary and the higher schools. One hundred marks (approximately twenty-five dollars) a year for each pupil is a small charge upon the city for the work which the continuation school performs. One method of reducing the cost of instruction is by curtailing the amount of equipment which is supplied for the various classes. To the eyes of an American, the equipment of the continuation schools often seems quite meager. There is no lavish display of apparatus, such as one often finds in American schools of a somewhat similar type. There is no lack of necessary equipment and supplies. There are, however, very little ostentation and very little waste. What is lost in this way, if there is any real loss, is more than compensated for by the smallness of the classes and the excellence of the teaching. Although no trade wherein the apprentices are fewer than twenty is entitled to a special continuation trade school, it does not follow that the class will always have twenty pupils. Within any given school there may be a considerable subdivision of classes. I have frequently seen instruction given to groups of only six, eight, or ten pupils.

What is said here about economy of equipment refers to the continuation schools. In the higher schools, such as the

Technische Hochschule, and the other state institutions, the expenditures for equipment are lavish. It would be difficult to find anywhere more elaborate provisions for the instruction of students.

Everywhere also, even in the continuation schools, there is an abundance of illustrative material. There is a museum, sometimes small to be sure, in almost every school. In the state schools these museums are unusually full and valuable.

Another way in which the expense of instruction is reduced is by the payment of small salaries to teachers. These salaries seem sometimes pitiably small. Nevertheless good men are attracted into the schools. Salaries in general in Germany not only for teachers but for other workers, are much lower than in America. There is, however, for public servants, in which number teachers are included, the certainty of a liberal pension on retirement. The whole scheme of pensions is worked out on an extensive scale in Germany. The German seems to prefer a small salary during his working years with the assurance of a liberal provision for his old age in the form of an annual pension for himself, or in case of death, for his widow and children, instead of a larger salary without such provision. It is this condition, in part at least, which makes it possible to have finely equipped men in the schools on a low-salary schedule. Even the men who have come into the schools from the trades without special preparation as teachers are for the most part men of fine points, clean-looking, strong and able men who know how to reach the boys under their care.

The account so far given has dealt exclusively with the schools for apprentices. There is, however, another important public service rendered by the Munich Continuation School. After the young apprentice has finished his course, and after he has become a journeyman, he still has numerous opportunities to return to the school for advanced instruction. Evening classes and Sunday classes are maintained in addition to regular day classes. The hours of instruction are adapted to the needs of the workers. In winter, when work is slack, more time is given to the classes than in busy seasons when the journeymen are needed in their trades. By means of these advanced classes, journeymen prepare to take the examination for the master's certificate. Even some masters who feel the need of keeping abreast of the times in their trade avail themselves of the opportunities afforded in the schools to gain those broader views and that greater skill from which they are excluded by the routine of their occupations.

Thus it may be seen that the Munich continuation schools are really great "improvement schools," ministering to the

needs of old and young, and thus raising the whole standard of industrial and civic life in the community.

Before finishing the account of industrial schools in Munich mention should be made of the Baugewerkschule or School for the Building Trades. Although this is a state, not a city, institution, and not technically a continuation school, it has some interesting features for the student of industrial education.

Pupils who enter this school must take an entrance examination, they must be at least sixteen years of age, and they must have had one year of practical experience in a trade. The course covers a period of two and one-half years divided into five semesters. Before entering upon the fourth semester, pupils must be nineteen years of age and they must have had two years of practical experience in a trade. The school does not maintain shops for practical instruction. All of the technical trade instruction is to be secured by actual experience of two years in a trade. The school confines itself to the problem of giving breadth and insight through its emphasis upon the theoretical and the scientific aspects of its curriculum.

This method of requiring students to have practical experience in a trade has a double advantage. It insures a real, practical background for the theoretical teaching of the school, and it releases the school from the necessity of providing expensive shops and of hiring teachers for the shop instruction.

As this report deals with industrial education in Germany, it is proper to give an account here of the Munich Workers' Museum, a museum which is intended for the instruction of both children and adults in sanitary living and in the prevention of accidents and disease. I noted a few of the very large number of exhibits as follows:—

1. Approved method of constructing scaffolding for outside of buildings and for roofs.
2. Approved sewer construction.
3. Interior scaffolding.
4. Street toilets for workmen.
5. Safety appliances for engines and machines.
6. Drawings of safety valves.
7. Mineral deposits in boilers.
8. Boiler appliances for safety.
9. Weaving appliances.
10. Electric insulating.
11. Rubber shoes for workers with electricity.
12. Belts and gloves and clothing for overhead-wire workers.
13. Pictures showing the destructive effects of electric currents upon the human body.

14. Safety ladders.
15. Elevator protection.
16. Protection for brewery workers.
17. Model of workroom for woodworkers.
18. Safety appliances for cars on hills and grades.
19. Suitable clothing for machinists.
20. Safety knots in ropes.
21. Protection against ends of long rods which laborers carry on their shoulders in the street.
22. Leather gloves, goggles, etc.
23. Ventilators.
24. Coverings for steam heaters.
25. Protectors over electric fans.
26. Vacuum cleaners.
27. Fire escape.
28. Proper containers for alcohol, benzine, petroleum, and other inflammable material.
29. Automatic fire alarms.
30. Helmets, face protectors, etc., for the rescue of miners.
31. Life preservers.
32. Stretchers.
33. Medical kit for aid to injured.
34. Splints, bandages, etc.
35. Illustration of methods of first aid.
36. Stretchers arranged properly in a wagon; in a sleigh.
37. Fire extinguishers.
38. Treatment of blood poisoning, snake bite, suffocation by water, etc.
39. Farm machinery arranged properly for protection about a barn.
40. Model of house and barn in the country.
41. Large tuberculosis exhibit with charts; specimens in alcohol, showing parts of body; safety appliance warnings.
42. Charts of sound and diseased teeth.
43. Weight of normal children.
44. Elements of nourishment needed.
45. Care of children; beds, cradles, clothing, nipples, bottles, feeding, sterilizing apparatus, thermos bottles, causes of death; means of strengthening children; elaborate display of children's little garments, proper dwellings.
46. Sanitation in the dairy.
47. Protection of foodstuffs from dust.
48. Proper table ware.
49. Illustrations of cuts of meat, with names and relative food values.

49a. A wrong position in sitting and standing.

50. Danger to eyes in some industrial pursuits; means of prevention.

51. Dangers of dust, kinds of dust; means of protection; safety appliances.
52. Dangers from certain metals and chemicals; means of protection.
53. Occupational diseases.
54. Alcohol in Germany.
55. Models and pictures of model workingmen's homes.
56. Gardens.
57. Sanitary kitchens with furniture and appliances shown in full size.

By showing people how to take care of themselves, Germany is trying to bring greater health, happiness and efficiency to her citizens.

II — OTHER BAVARIAN SCHOOLS

(A) Augsburg — Augsburg affords an interesting comparative study of the corporation school and the public day trade school. The day trade school is supported by the city, the county, and the state. Pupils are admitted from the Volksschule at the age of fourteen. The course is for three years. The school day extends from seven A. M. to twelve and from two to six P. M. except on Saturday, when the hours from two to six are free. Though the nominal fee is twenty-five marks ($6.25) a year, the manufacturers of the city have so much interest in the school that they provide scholarships for a large number of the students. The employers in the weaving and spinning industry supply the weaving and spinning machines for the school and in addition contribute five thousand marks a year towards the expenses of administration.

The building is excellent and the equipment ample. For the purpose of replacing old-style machines with the newest patterns, a fund is set aside each year to be used for this purpose alone.

The students produce goods of marketable value. In Augsburg these products of the school are sold only to the masters of the city. There is no restriction put upon sales that are made outside of the city.

Three kinds of teachers are employed in the school. Masters give the practical instruction; men who have had training in a scientific college give the scientific and theoretical instruction; teachers from the elementary schools give the courses in the usual academic work.

At the time of my visit, the boys were busily engaged in making equipment for an addition to the school. They were

working upon downspouts, gates, roof decorations, interior iron stairways, railings, and doors.

The school as a whole seemed to be well organized. With some modifications its work would be adaptable to American conditions.

Another interesting school in Augsburg is the corporation school maintained by the Augsburg Maschinenfabrik. This factory produces printing presses, Diesel engines, and ice machines. It employs about three thousand workmen. The corporation school maintained by the management of the factory gives instruction to two hundred and sixty apprentices. Boys are received from the Volksschule at the age of fourteen years. They have a course of instruction covering four years. They devote fifty-six hours a week to work and study in the factory. (They have compulsory religious instruction in the Sunday school in addition.) For the first three years they have twelve hours a week for study and in the last year seven hours a week for the same purpose. Work and study occupy ten hours a day for five days in the week and six hours on Saturday. During the period of the apprenticeship the boys receive pay ranging from four pfenninge an hour at first to fifteen pfenninge (about three and three-quarters cents) an hour at the end of their course. Every boy who conducts himself creditably during the four years of apprenticeship receives at the end a special premium of three hundred marks for good behavior. Somewhat more than one-third of the boys who finish the course take positions as journeymen in the factory.

The avowed purpose of the school is to prepare boys for work in the shops. There is no thought of giving training for the office, for designing, or for any of the higher positions in the service. Every effort is made to bind the boys and the men to the factory. For the men and their families there is a factory colony offering opportunity for cheap rent.

Everything required by the boys during this period of study is furnished free. There is also a library, which is liberally patronized. The boys have an organization of Jugendwehr and they frequently take Wanderungen or excursions with their teachers.

It was interesting to note that for the sake of saving time typewritten copies of all lessons are given to the members of the class. By relieving the boys of the necessity of taking notes from dictation, more time is free for the actual work of instruction. Thus the principle of efficiency is carried out in the school as in the shop.

Although the school is well organized for its purpose, and is doing good work, I received the impression that the training is narrow and dictated by the personal interests of the employers. In such a subject as drawing, for example, there is no attempt to teach anything except that which has strictly utilitarian value. The drawing in the public trade school was liberalizing in its purpose; in this corporation school the emphasis was upon mechanical drawing of a type which would be directly useful to the work of this particular factory.

When I came away from my visit, I thought that I had just seen the beginning of a system of industrial feudalism, a system which might prove as dangerous as the military feudalism of earlier days. The fact that this feudalism might sometimes or often be benevolent did not alter my conviction that it is not a system which would be in harmony with the spirit of American institutions.

(B) Nürnberg — The unfavorable impression made by the corporation school was strengthened by my visit to the apprentice school maintained by the Siemens-Schuchert Company in Nürnberg. The Siemens-Schuchert Company is one of the largest industrial establishments in Germany. It employs ten thousand workers in Nürnberg alone and about eighty thousand in the Empire. Its Nürnberg establishment maintains an aprentice continuation school for the male children of the employes. At the time of my visit there were three hundred boys in attendance.

The course in this school covers four years. The theoretical instruction occupies eight hours a week for the first class; ten hours for the second class; and twelve hours for the third class. The fourth-year class has no theoretical instruction. All practical instruction is given in a shop for apprentices. This is quite in contrast with the plan of the Augsburg school. There the boys work in all departments of the factory side by side with the men. In Nürnberg, on the other hand, the apprentices are confined to their own shop. What they produce is either used in the factory or sold. The apprentices of the first three classes receive only Taschengeld; those of the fourth class receive ten or twelve pfenninge per hour.

The purpose of the Nürnberg school is to train skilled workmen and foremen for the shops of the Siemens-Schuchert Company. About forty-four per cent of the apprentices remain with the company after finishing their apprenticeship.

In order to train as intensively and as directly as possible for the work of the factory, great stress is laid upon mechanical drawing. Freehand drawing receives scant consideration. All the drawing was exceedingly fine, as it was almost everywhere in the schools I visited.

The factory school does a fine piece of social work for the male children of employes — a work similar to that which is conducted quite extensively in the elementary schools of

Munich. The hours of adult labor are usually from seven A. M. to six P. M., with two hours allowed for meals. The result of these long hours of labor is that parents are frequently unable to give any attention to their children in the late afternoon and early evening. After the close of the elementary school day at four o'clock, in order to provide for the boys under the apprentice age the factory school maintains a Knabenhorte from five to seven P. M. In this Refuge School instruction is given in cardboard construction and in drawing and opportunity is afforded for preparing the school tasks assigned for the next day.

If specific instruction for the work of only one factory were desirable in the training of a boy, then only praise could be bestowed upon the corporation schools at both Augsburg and Nürnberg. I cannot believe, however, that in the long run such limited training is good for the social organism as a whole. It certainly does not commend itself to me as an experiment that would be likely to develop desirable reactions in American life.

Another significant school in Nürnberg is the Konigliche Technikum. This fine institution occupies a new building which was constructed at a cost of M. 2,000,000 ($500,000). It has accommodations for two hundred and seventy students. The work of the school is divided into four departments for training in mechanical engineering, electrical engineering, chemical engineering, and mining engineering. The course in mining engineering gives preparation for all kinds of underground construction. The course for each of the departments covers a period of two years.

Boys who posses the certificate of privilege for one-year military service (einjährige-freiwillige) are admitted to the school without examination, provided they have had two years of actual shop experience. One of these two years may be spent in the well-equipped workshops which the school maintains for the preparatory course. Each of these workshops is in charge of a Werkmeister, who has had experience in industry. Boys who do not possess the einjährige-freiwillige certificate are required to have six years of actual shop practice before beginning the regular course of the school. For such boys an entrance examination is required.

Since all boys who enter upon the regular work of the school have had practical industrial experience, the school does not give any shop training. The plan is to give a thorough scientific training which, it is believed, will take on new significance in the light of the previous practical experience of the student. In fulfillment of the general plan, excellent laboratories for experimentation and for testing are maintained.

An interesting illustration of the rigidity of the German scheme of education is afforded by the attitude of the educational administration towards the young men who finish the course at the Technikum. Finely equipped as these students are for advanced study, they are not eligible to receive the degrees of the Hochschule, the highest scientific institution of the state. They may attend the Hochschule, but they do not have the stamp of full academic approval for the simple reason that they have not fulfilled the requirements for admission according to the standards set by the Gymnasium or the Oberrealschule. Thus the Technikum stands as an institution which gives an excellent scientific education of intermediate grade. Its graduates are expected to fill positions of great usefulness and of profit. The highest and choicest positions, however, are reserved for the favored men who have satisfied the letter of the academic law.

The Städtische Bauschule or Municipal School for Builders in Nürnberg resembles the Baugewerkschule of Munich. Boys must be sixteen years old before entering the school, and they must have had one year of actual experience in industry. Then after one and one-half years of study, the students must have another year of work in the shop or factory before they are allowed to enter upon the last year. Thus the school course of two and one-half years is built upon two years of experience — one year before the boys enter the school and an additional year following upon the first year and a half of their course. By virtue of this arrangement, the school is able to eliminate all shop practice and to confine its attention to training in theory. The evening course as a department of this school is most interesting. Students are permitted to take only six hours a week in this department. They attend sessions of two hours each on three nights of the week. Boys of fourteen years and men of twenty-five or thirty constitute the student body. Boys are not allowed to substitute the evening course for the work in the continuation school. They must take that work in addition. Theoretical instruction is given in fifty-five different trades. Drawing occupies a large place in the program of studies. In order to furnish models of mechanical appliances and of machines for use in the drawing courses, the school maintains a mechanical workshop under a Werkmeister with six Lehrlinge as assistants. These Lehrlinge or apprentices work without pay from seven to twelve and from one-thirty to six.

One frequently hears a questioner ask how it is that Germany, with such a rigid educational scheme, is able to develop

so much originality. The evening department of the Bauschule illustrates one way in which this is done. Prizes in money and books are offered to pupils who make at home original models in wood or reinforced concrete, or stone, or who produce mathematical models or designs of houses.

The Bauschule occupies an old university building with accommodations for five hundred students in the day courses and three hundred at night.

Although elementary schools do not come immediately within the scope of this report, there is one elementary school in Nürnberg of which some mention ought to be made on account of a successful experiment which it is conducting in industrial education. This school is the Scharrerstrasse Volksschule. Under the direction of Herr Viktor Wolfinger, one of the teachers of the eighth class, there is developing in the Scharrerstrasse School a most significant course in handwork closely linked up with a study of the principles of physics.

As in Munich, the school is in session from eight to twelve and from two to four. On Wednesday and Saturday there are half holidays. Eight hours a week are devoted to industrial subjects. These hours are distributed as follows: Two hours for drawing, two hours for the science of materials, two hours for theoretical instruction in physical principles, and two hours for shop practice.

At the time of my visit the regular class teachers were giving all the instruction. For work beyond the regular thirty hours per week they are paid ninety marks a year per hour.

The city allows one mark a year for each boy for materials used in the workshop. The cost of shop equipment, including floor, gas connections, benches, tools, and the like, amounted to about thirty-six hundred marks.

While one-half of the class of boys (twenty-three in number) are at work in the shop, the other half are at home.

In connection with the study of physics excellent drawings of the objects to be produced are made. It was surprising to note, however, that these drawings were without dimensions, and that when completed they were not used in the actual making of the objects represented.

After explanation and suggestion by the teacher, the boys are asked to make at home the apparatus which will illustrate the physical principles under consideration. The boys are urged to make use of inexpensive material that is within easy reach. In quite a remarkable way these eighth-class boys had responded to the suggestions of their teachers. The apparatus which I saw was constructed of cheap and common material, such as is frequently thrown into the waste, but it

was apparatus that would really work. I noted at the time the following objects among a large number of others which the boys had made:—

Overhead water wheel, undershot water wheel, hygroscope, angle mirror, turbine (made out of an old cocoa can with some help from the boy's father in soldering), wind mill, eccentric wheels, mechanical hammers, stamping machine, machine for drawing ellipse, boring machine (for drilling wells), simple electric dynamo, rectangular equivalents of triangles in cardboard, apparatus for measuring angles to determine height of buildings, Leyden jars, galvanometer, cone transmission (made out of spools), multiple pulley transmission.

In the exhibition room I found many objects which the boys had made in the shop under the direction of the teacher.

Some of these were the following:—

1. Apparatus for measuring the length of shadows from a sliding candle at different heights.
2. Apparatus to show side water pressure at different depths (a tall glass jar perforated at three different heights; when the jar was filled with water, streams flowed out to different lengths from the three perforations).
3. Pelton water wheel.
4. A small carriage on three wheels set in motion by an air propellor (the propellor was set in motion by very quickly unwinding a string from a connecting rod).
5. Cardboard fan, shaped like a windmill, with close wings, set in motion by vibration of air when fan was held over a flame.
6. Glass rods (bent by pupils with a blowpipe), fitted in a form to show circulation of water when heat is applied at a given point.
7. Cardboard frame with openings and mirror to show angle of incidence and angle of reflection.
8. Cardboard box with small perforations to show inverted image.
9. Corked bottle with inverted bent glass tube to show effect of steam under pressure when heat is applied to bottom of bottle (an old ink bottle was used for an alcohol lamp).
10. Three-sided box to show projections of views by wires.
11. Apparatus for measuring high buildings by means of triangles.
12. Three eccentric wheels with punching rods.
13. Apparatus to show how a metal frame (hal[illegible] under the influence of a current of electricit[illegible]
14. Sets of pulleys.
15. Two different kinds of jacks.
16. Model of a scale for weighing heavy o[illegible]
17. Governors.

18. Deep shaft elevator with register to record depth of car.
19. Moving-picture effect with cardboard.
20. Little pinhole camera.
21. Color-mixing top.
22. Test tube with inverted glass tube set in flask of water to show how to make gas from coal.

Articles which the boys make at home become their personal property. The school retains finished objects made in the shop because they represent the joint work of two or more boys. Thus the boys are taught to perform a piece of social service.

An inspection of the work of this school convinced me that a real piece of constructive work is under way there. Physics, drawing, and shop work taught in this way take on a meaning which they could not have if they were handled in an abstract, academic fashion. The great social value that belongs to a scheme of instruction which teaches economy in the use of materials and the utilization of all available resources can scarcely be overestimated.

While in Nürnberg I had the privilege of inspecting the factory and the warerooms of the greatest toy manufacturing plant in the world, Gebrüder Bing, A. G. Although not intended as an educational institution, their establishment might be made to serve an educational purpose. I found on exhibit many toys which could well be used for illustrative purposes in the schools. Material suitable for all grades, from the kindergarten through the high school, could be purchased at low prices and substituted, particularly in the high school, for much of the expensive apparatus which now adorns the shelves of the laboratories.

American schools could greatly reduce the cost of equipment of laboratories by adopting the procedure just described in connection with the ingenious toys which illustrate physical principles instead of buying expensive commercial apparatus for the same purpose.

(C) Fürth — The Handwerkerfachschule für Holzindustrie in Fürth is an interesting illustration of the co-operation of city, county, and state in the maintenance of a school. The building is beautiful and expensive. It was erected at a cost of two hundred and fifty thousands marks (nearly $65,000). It accommodates only fifty day pupils and one hundred night

who have finished the work of the elementary admitted without examination. They are apprenyears to the principal of the school. Then if examination they become journeymen.

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